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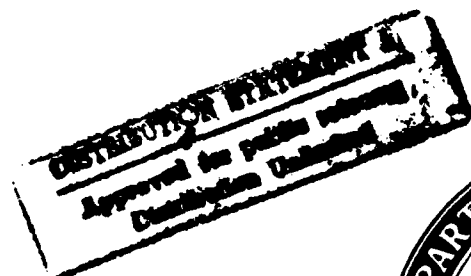


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REPORT OF THE  
DEFENSE SCIENCE BOARD  
TASK FORCE  
ON

C-17 REVIEW

DECEMBER 1993



OFFICE OF THE UNDER SECRETARY OF DEFENSE  
FOR ACQUISITION & TECHNOLOGY  
WASHINGTON, D.C. 20301-3140

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DEFENSE SCIENCE  
BOARD

OFFICE OF THE SECRETARY OF DEFENSE  
WASHINGTON, D.C. 20301-3140

MEMORANDUM FOR UNDER SECRETARY OF DEFENSE (ACQUISITION)

SUBJECT: Report of the Defense Science Board (DSB) C-17 Task Force

I am pleased to forward the final report of the DSB study on the C-17. This study was conducted at your request to assess the current status of the C-17, the contractor's capability to successfully complete C-17 development and transition into production, and to identify the changes that would be necessary to ensure success and reduce risk. In developing its findings and recommendations, the Task Force established seven Integrated Product Teams to assess the current program as well as investigate all other pertinent issues.

The Task Force developed a detailed list of findings in the Technical, Financial, Schedule, and Program Management categories. These findings are documented in the report. The primary findings, however, are related to the management and contractual gridlock that has developed over time due to the program environment. This environment is at least in part aggravated by cost overruns, schedule slips, concurrency between development and production, specification issues, and development design changes leading to many claims and counter claims.

The Task Force has developed specific recommendations that deal with all of the findings. I concur with their recommendations. I particularly support their primary recommendation that the program cannot proceed towards successful completion under the existing environment. In order to resolve this situation and to ensure success and reduce risk, an overall consolidated settlement must be reached and implemented. This settlement would lead to a new C-17 program environment that fosters trust, teamwork, empowerment and accountability. It would specifically resolve the specification (e.g., range/payload); (e.g., late delivery of aircraft); and all of the claims. It also would improve program management, incentivize productivity improvements to reduce costs, and reduce future risk.

In submitting this report, I have also appended the findings of the Senior Level Review Group (SLRG). Although not part of the DSB report the view graphs from the SLRG briefing to you are included for completeness.

DAVID R. HEEBNER  
Vice Chairman



DEFENSE SCIENCE  
BOARD

OFFICE OF THE SECRETARY OF DEFENSE  
WASHINGTON, D.C. 20301-3140

MEMORANDUM FOR CHAIRMAN, DEFENSE SCIENCE BOARD  
SUBJ: Report of the Defense Science Board C-17 Task Force

1. Attached is the final report of the DSB C-17 Task Force. The Task Force was convened by the Under Secretary of Defense for Acquisition (USD(A)) to assess the current status of the C-17 and the contractor's capability to successfully complete the C-17 development and transition into production, and to identify the changes necessary to reduce program risk (full Terms of Reference in Appendix A).

2. The Task Force assembled a special high-level review group as an independent expert body, responsible to the USD(A) for their overall assessment and recommendation. This group, termed the Senior Level Review Group (SLRG), was composed of the following principals:

Co-Chairmen

Mr. Robert A. Fuhrman	President and COO (Ret) Lockheed
Lt Gen James A. Fain, Jr.	Commander, Aeronautical Systems Center

Members

Mr. Edward C. Aldridge, Jr.	President, Aerospace Corporation
Mr. Oliver C. Boileau, Jr.	President and GM B-2 Division, Northrop
Dr. Malcolm R. Currie	Chairman and CEO (Ret) Hughes Aircraft

3. The SLRG, in turn, organized seven Integrated Product Teams (IPTs), each addressing major facets of the program and having about 75 experts from a variety of disciplines (engineering, manufacturing, testing, finance, program management, contracting and support). Comprehensive reviews and analyses by the IPTs, as well as in-depth reviews by the SLRG, formed the basis for a detailed list of findings and specific recommendations.

4. One major finding is that the C-17 is basically a sound design and will be capable of meeting most of the realistic operational requirements of the Department of Defense. However, another major finding relates to the extremely negative management environment between the contractor and the U.S. Government which has created gridlock and has seriously impeded progress. The program cannot move forward successfully in this environment. Several of the other detailed findings relate to:

a. Range/Payload. The C-17 will not meet original contract specifications but will meet the users' needs.

b. Engineering. Significant engineering remains (i.e., C-17 is a concurrent program), systems engineering is ineffective and processes are inadequate.

c. Transition to Production and Manufacturing. The process is inefficient (parts shortages, producibility changes, tool proofing, work force turnover, etc.).

d. Flight Test. The program is behind schedule and will require more flight hours to complete than originally planned.

e. Program Management. The systems are insufficient to maintain adequate control over cost, schedule, and performance.

f. Subcontract Management. Management of subcontractors is adequate.

g. Supportability. Logistics support is well planned and in place.

5. Our key recommendation is to implement a solution in which all contractual issues, claims and program deficiencies are combined and implemented as a consolidated settlement. The SLRG is unanimous in this recommendation. This can clear the air and constitute the basis for proceeding with a highly successful program. The individual recommendations and actions making up this consolidated settlement, involving a long history of claims and contractual gridlock on both sides, cannot be applied separately and be successful.

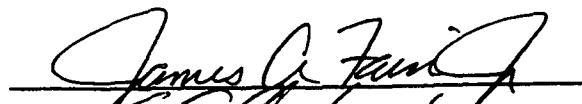
6. As support for this major recommendation, the Task Force has provided detailed specific inputs relating to range/payload, engineering processes and deficiencies, financial incentives, unit cost, management information systems, application of CAD/CAM, organization, and realistic production and testing schedules.

7. We believe that the C-17 program will be successful if, and only if, the consolidated settlement is executed and the other recommendations detailed in this report are carried out.


Mr. Robert A. Fuhrman



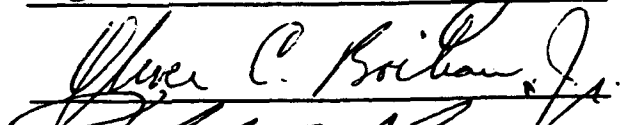
Lt Gen James A. Fain, Jr.



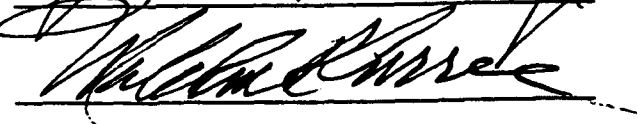
Mr. Edward C. Aldridge, Jr.



Mr. Oliver C. Boileau, Jr.



Dr. Malcolm R. Currie



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# TABLE OF CONTENTS

TABLE OF CONTENTS .....	ii
INTRODUCTION .....	1
APPROACH .....	1
C-17 PROGRAM HISTORY .....	1
C-17 PROGRAM STATUS .....	3
FINDINGS .....	4
TECHNICAL .....	4
FINANCIAL .....	7
SCHEDULE .....	8
PROGRAM MANAGEMENT .....	9
RECOMMENDATIONS .....	11
NEW PROGRAM ENVIRONMENT .....	11
PROGRAM MANAGEMENT APPROACH .....	12
REDUCE THE FUTURE RISK .....	12
CONSOLIDATED SOLUTION STRATEGY .....	14
CONCLUSION .....	15
APPENDICES .....	16
A. TERMS OF REFERENCE .....	17
B. METHODOLOGY .....	19
C. DSB TASK FORCE MEMBERSHIP .....	22
D. GLOSSARY .....	26
E. SLRG BRIEFING .....	28
(Briefing presented to USD(A))	

# **DEFENSE SCIENCE BOARD C-17 TASK FORCE REPORT**

## **INTRODUCTION**

The Defense Science Board (DSB) Task Force for the C-17 program was convened in response to a request from the Under Secretary of Defense for Acquisition (USD(A)). The USD(A) tasked the DSB to assess the current status of the C-17, to evaluate McDonnell Douglas Corporation's (MDC's) capability to successfully complete the C-17 development and transition into production, and to identify the changes necessary to reduce risk and ensure the success of the C-17 program in accordance with the Terms of Reference included in Appendix A. The DSB did not address alternatives for fulfilling airlift requirements.

### **APPROACH**

The DSB assembled a special high-level review group as an independent expert body, responsible to the USD(A) for the overall assessment and recommendation. This group, referred to as the Senior Level Review Group (SLRG) of the DSB C-17 Task Force, was composed of the following principals:

Mr. Robert A. Fuhrman	President and COO (Ret), Lockheed Corporation
Lt Gen James A. Fain, Jr.	Commander, Aeronautical Systems Center
Mr. Edward C. Aldridge, Jr.	President, The Aerospace Corporation
Mr. Oliver C. Boileau, Jr.	President B-2 Division, Northrop Corporation
Dr. Malcolm R. Currie	Chairman and CEO (Ret), Hughes Aircraft

To conduct the required comprehensive review of the entire C-17 program, the SLRG organized Integrated Product Teams (IPTs) [Task Force methodology is detailed in Appendix B]. These teams included members from systems engineering, production transition and manufacturing, supportability, ground and flight testing, financial management, contracting, and program management. The membership is shown in Appendix C. The detailed findings of these IPTs, as well as first-hand reviews by the SLRG itself, led to the specific findings and recommendations of this Task Force. The findings in this report reflect the C-17 program as of July 15, 1993.

### **C-17 PROGRAM HISTORY**

**1. C-17 Requirement.** The C-17 is intended to be Air Mobility Command's (AMC's) core airlifter and the cornerstone of future airlift forces. Today's primary airlifter, the C-141, is nearing the end of its service life with an average age of 27 years and 37,000 flight hours. The C-17 is the only aircraft specifically designed to meet the validated requirement for future airlift, such as delivery of large Army equipment to short austere fields, in theater and over transoceanic distances, with ground maneuverability/backing to optimize operations on crowded/austere fields. The remaining airlift forces are not considered adequate to provide the airlift required to meet all future Global Reach missions. The C-17 is proposed to fill this gap.



**2. Contract Award.** The MDC won the competitive source selection for the C-17 in August 1981. Funding constraints placed on the program at that time prohibited contract award coincident with announcement of the source selection decision. The program was restructured to a modestly paced development program and the contract was awarded in July 1982. Included in the contract award was a clause in which the contractor and Government agreed that the prices in the contract were subject to adjustment when funding was received for the C-17 Full-Scale Engineering Development (now referred to as Engineering, Manufacturing, and Development -- EMD; we will use the EMD term to refer to this program phase throughout this report). This special provision allowed for adjustments to the competitively derived source selection pricing resulting from changes in the mid-point of effort, utilization of period of performance rates, and loss of efficiency, if any, attendant to schedule stretch-out.

**3. Program Environment.** At the time of contract award, both the Government and MDC envisioned a program based on commercial practices, minimum Government involvement, and a concurrent development/production effort. Consequently, a fixed price incentive contract was used to match the perceived low risk of the program. The program, however, turned out to be considerably more complex than originally forecast. Failure on the part of both parties to recognize this increased complexity and contract performance difficulties led them to support the original program schedule and funding profile long after it should have been contractually adjusted.

In early 1989, the program environment was further complicated when MDC instituted a Total Quality Management (TQM) program which displaced nearly all of the middle management personnel at their Long Beach, CA facility. Prior to this point, MDC had used functional middle managers as informal integrators. With the loss of middle management informal communication and without the existence of any type of electronic means of effecting integration, program progress over the next 12 months came to a virtual standstill. This action was accomplished with the full awareness and tolerance of the Government. However, several oversight agencies began to raise concerns. The program overcame these initial concerns, but continuing poor performance drew even more oversight as credibility steadily eroded. In the face of this poor performance and the fixed price contract, the contractor began to cut expenditures in an effort to reduce losses. As the losses continued to mount across MDC, program decisions took on a short-term focus. Some proposed productivity investments promising significant future gains were not implemented. At the same time, the SPO adopted an arms length attitude. As the program came under increasing scrutiny and the long-term viability of the C-17 began to be questioned, MDC turned to claims as the most likely avenue for solving problems and recouping its heavy (\$1B plus) losses. These claims became a barrier to normal program execution.

As the environmental situation continued to decline, contract performance fell further behind schedule causing increased Government oversight. This resulted in the elevation of routine, programmatic decisions to higher corporate and Government levels on a regular basis. Because of the extensive oversight and adverse image, the entire Government system became stymied with a concern that any solution short of extracting major consideration from the contractor would be considered a "bailout." This, in turn, led to gridlock in solving the problems and left the managers on both sides unable to resolve issues effectively. Every System Program Office (SPO) or Defense Plant Representative Office (DPRO) attempt to provide guidance raised concerns of even larger cost overruns or the possibility of future claims. The contractor became preoccupied with limiting his losses, the SPO concentrated on delivering aircraft to flight test and to the user, and the DPRO focused on enforcing a contract which had not been updated. In this environment, normal team problem solving ceased to exist.

## **C-17 PROGRAM STATUS**

The present C-17 program environment reflects the conflicts inherent in a program with significant concurrency between its EMD and Production efforts, as well as all of the normal problems, short-term fixes, and resource drains associated with a development program. The program's contract, however, reflects the original concept of a straight forward, fixed-price-incentive, minimum development program with little risk to the contractor. A realistic appraisal reveals that the C-17 has not been a minimum developmental effort as originally envisioned and that the concurrency originally planned has been significantly increased by unforeseen test failures and schedule delays.

The C-17 design remains immature, but typical of an aircraft at this stage of development. This design immaturity is evidenced by the large number of engineering changes still backlogged. In May 1993 alone, over 1,000 changes were issued directly impacting production. The backlog of engineering changes at the end of May 1993 reveals 5,800 open work authorizations. Based on the continuing high volume of change traffic, the Functional Configuration Audit/Physical Configuration Audit (FCA/PCA) conducted on aircraft P-5 was premature. As a result, MDC has retained total responsibility for configuration management.

The test program continues to progress despite the set-back encountered when the wing failed static load tests. This test requires the wing to be loaded to 150 percent of the design limitation. The C-17 wing failed at the 128 percent. Total aircraft static testing is about 40 percent complete, while durability is about 10 percent complete. These tests are scheduled for completion in February 1994 and February 1995, respectively. MDC has implemented wing design changes and has resumed static load testing of this redesigned wing with a scheduled completion date of October 15, 1993. Qualification testing is over 80 percent complete, currently scheduled for completion in December 1994. The flight test program has completed 3,000 of the required 7,000 test points. The 80 flight test month test program now on contract is scheduled for completion in September 1993. The SPO is in the process of extending this flight test program to complete in March 1995.

As of July 15, 1993, six production aircraft and one test aircraft have been delivered. All seven aircraft were delivered late. However, from aircraft P-7 on, MDC will meet the revised contract delivery schedule. Aircraft from P-7 through P-14 are on contract and in assembly. Advanced procurement funding has been released for 14 additional aircraft. The dedicated test aircraft (T-1) and five production aircraft (P-1 through P-5) are assigned to the test program. Aircraft P-6 was delivered to AMC at Charleston AFB SC in June 1993, where it is undergoing operational validation. Initial Operational Capability (IOC) will be declared at the discretion of the AMC commander. AMC requires the delivery and support of 12 similarly configured aircraft for this event to take place. IOC is presently scheduled for January 1995, with an extensive Reliability, Maintainability, and Availability (RM&A) evaluation to begin 30 days later. Milestone IIIB is scheduled for July 1995.

## FINDINGS

This section of the report contains the specific findings, observations, and conclusions of the SLRG. The review was conducted over a 6-week period at the C-17 SPO, Wright-Patterson AFB, OH; MDC, Long Beach, CA; the DPRO, Long Beach, CA; the C-17 Combined Test Force (CTF), Edwards AFB, CA; and several subcontractor facilities. The findings are separated into four categories: Technical, Schedule, Financial, and Program Management.

### TECHNICAL

**1. Range/Payload will not Meet Specification.** The basic design for the current C-17 is nearly complete, but it will not meet all of the contracted range/payload specifications. The primary reasons for these shortfalls are the aircraft weight growth, aircraft drag increase, and the failure of the engine to meet Specific Fuel Consumption (SFC) expectations. Using the performance methodologies required by the specifications for two specific missions, the predicted payload shortfalls are as follows:

<u>MISSION</u>	<u>SPECIFICATION PAYLOAD/RANGE</u>	<u>PAYLOAD SHORTFALL</u>
Maximum Payload	160,000 lbs/2,400 NM	9,775 lbs
Heavy Logistics B	130,000 lbs/3,200 NM	36,655 lbs

Based on this performance and our assessment of the C-17, the specification payload requirement cannot be achieved with the current design and within the existing time and resources available.

**2. Design Improvements are Required to Enhance Range/Payload Performance.** MDC identified several low risk specification and design initiatives to improve the C-17 range/payload performance. These initiatives include:

- a. Retaining the P&W F117 commercial baseline with the planned commercial improvements to improve SFC by 0.4 percent
- b. Reducing the aircraft drag by 1 percent
- c. Implementing weight reduction initiatives to reduce empty weight by 1,500 lbs
- d. Increasing maximum takeoff gross weight by 5,000 lbs to 585,000 lbs

We concur with the SPO and the contractor that these initiatives are feasible, practicable and represent real gains in range/payload performance. Our performance assessment, based on the incorporation of these initiatives, is as follows:

<u>MISSION</u>	<u>SPECIFICATION PAYLOAD/RANGE</u>	<u>PAYLOAD SHORTFALL</u>
Maximum Payload	160,000 lbs/2,400 NM	2,701 lbs
Heavy Logistics B	130,000 lbs/3,200 NM	28,204 lbs

**3. Operational Methodology is not Used to Calculate Range/Payload Performance or Specifications.** The contract range/payload specifications were developed using traditional methodology for computing fuel requirements. The traditional methodologies simulate the operational environment and are used to provide a margin for weight growth and less than optimal engine performance. If C-17 range/payload performance is assessed using operating methodologies, as opposed to the traditional specification methodologies, the range/payload performance is closer to the specification values. The C-17 performance differences between the traditional and operational methodologies include fuel type, ground operation prior to takeoff, climb and cruise profiles, range credit for descent, and reserve and holding fuel. If the operational methodology criteria and historical weight growth (3,429 lbs) and drag growth (0.5 percent) are used, with the inclusion of the low risk performance improvements in paragraph 2 above, our assessment of the C-17 is as follows:

<u>MISSION</u>	<u>SPECIFICATION PAYLOAD/RANGE</u>	<u>PAYLOAD SHORTFALL</u>
Maximum Payload	160,000 lbs/2,400 NM	1,917 lbs
Heavy Logistics B	130,000 lbs/3,200 NM	6,670 lbs

While the current aircraft does not meet the actual range/payload specifications, the short-falls are significantly reduced through the use of operational performance assessment methodologies.

**4. Significant Engineering Effort Remains.** The C-17 program is in a development phase with significant ongoing component and system qualification testing, aircraft static and durability testing, flight testing, and redesign. The component qualification program is approximately 83 percent complete. Redesigns and retrofits for previous qualification test failures with the wing and the aircraft's flaps and slats are being incorporated. The current version of the redesigned wing involves adding stainless steel straps to the stringers and stiffeners to various ribs and spars. The productionized version of this redesign will eliminate the straps and stiffeners and strengthen the basic wing components.

Due to the significant amount of remaining engineering and testing effort, there will continue to be the typical EMD redesigns/retrofits. Given development and production concurrency, we can expect further production impacts.

**5. Systems Engineering Processes are Ineffective.** Neither the Government nor the contractor have an effective systems engineering process in place. This situation is revealed by:

- a. Lack of:
  - (1) Systems engineering management policy and procedures
  - (2) Risk management plans
  - (3) Interface control working groups

**b. Significant unsolved multidisciplinary engineering issues:**

- (1) Built-In-Test (BIT) high false alarm rate
- (2) RM&A growth requirements
- (3) Mission computer reserve capacity currently less than required

Additionally, although the flight test program is scheduled through 1994, there is no plan for future software builds beyond December 1993. These problems indicate a lack of a realistic, focused, and integrated systems engineering planning process.

**6. RM&A Needs Improvement.** RM&A is critical to long-term supportability, peacetime availability, wartime utilization and the ability to keep Operational and Support (O&S) costs at affordable levels. While maintain-ability and availability are meeting their goals, reliability values are below requirements. The C-17 reliability program (as it is presently being executed) will not ensure that adequate reliability will be demonstrated in a timely manner and is not aggressive enough to ensure adequate reliability is designed into the subsystem components. A more focused program is required.

**7. Production Efficiencies are not Being Achieved.** The C-17 has been developed using a design, test and redesign, methodology. Although workable, it is not efficient. The causes of these inefficiencies are:

- a. Late qualification testing and a passive RM&A program which results in continued engineering changes that plague the design
- b. Immature processes for fabricating and assembly of the parts and components that drive a significant number of producibility changes for the reduction of unit cost
- c. The lack of modern design and manufacturing tools such as Computer Aided Design/Computer Aided Manufacturing (CAD/CAM)
- d. The current quality system at MDC lends itself to an "inspect-in quality" attitude. We found that a prevention-oriented quality systems approach to manufacturing and subcontractor management is virtually nonexistent
- e. Late qualification of the assembly jigs, inconsistent quality of the work instructions, inconsistent updating of the drawings, and a high rate of assembly personnel turnover

These inefficiencies have caused delays in a production schedule which has little margin for error. The program is not being managed to a "design-to-cost" goal and has not established aircraft unit cost goals/targets. If MDC continues to use the current manufacturing, tool proofing, and quality processes, it is extremely unlikely it can maintain the planned production schedule ramp-up to 16 aircraft per year and at the same time reduce unit cost.

**8. Advanced Quality System (AQS) on the C-17 Necessary for Cost Containment/Reduction.** The MDC is implementing a MIL-Q-9858-A quality system on the C-17 program. The implementation of this system has been in a reactive "inspect-in" mode in which the Material Review Board (MRB) system is used to fix discrepant items with emphasis on ensuring safety. There is an unfortunate tendency toward acceptance of nonconforming parts and assemblies through this process due to perceived schedule

pressures. Consequently, rework is necessary on the factory floor. This results in out-of-station work and compromises unit cost and span times. The problem has extended to the subcontractor management responsible for fabrication and delivery of the parts and components to the factory assembly floor. This situation exists because of the traditional practice of placing emphasis on the detection, by inspection, and correction of defective items. An AQS would change the focus from defect detection to one of defect prevention. This change in focus has occurred in many manufacturing organizations that are aggressively managing manufacturing cost, product safety, and reliability.

**9. Flight Test Program Duration is not Adequate.** The development contract (2108) specifies an 80 aircraft month flight test program. However, in April 1993, the Government and MDC rebaselined the flight test schedule after it had become apparent that testing could not be completed within that time period. Under the rebaselined schedule, Developmental, Test, and Evaluation (DT&E) will be complete in December 1994 and Dedicated, Initial Operational Test and Evaluation (DIOT&E) by March 1995. The rebaselined schedule allows for approximately 152-aircraft months to complete the test effort. This test program is not currently on contract. The rebaselined test program is reasonable and will provide all of the data required for Milestone IIIB decisions, assuming the test aircraft retrofit plan stays on track and no major failures occur in the other related test efforts.

**10. Live Fire Test (LFT) of a Production Wing is not Beneficial:** In December 1992, the program was directed to include a production representative wing as part of the LFT. The current cost for a production wing test is \$45M. If conducted, the productionized wing LFT is too late in the program for this test to effectively impact the design. Therefore, any benefit in a production wing LFT at this point is outweighed by the substantial cost.

**11. Supportability Appears to be Well Planned:** A good logistics planning baseline (availability of support equipment, technical orders, maintenance training equipment, and spare parts) exists for the operational support of the C-17. The maintenance concept is well defined and in line with current Air Force policy. Organizational-level logistics support at Charleston AFB, SC is essentially in place and Intermediate-level support is being delivered. Work-arounds have been developed for the minor shortcomings which have been identified. Future organizational-level site requirements will be based on the operational experience at Charleston AFB SC. Depot planning is complete and the process of identifying and acquiring depot support elements is on schedule. Processes are in place to provide for adjustments in support elements driven by changes resulting from flight test, qualification test, and RM&A growth. Overall, the supportability program is adequate to provide the required operational capability.

## **FINANCIAL**

**1. Acquisition Program Cost Methodology is Reasonable.** The acquisition program cost approach and methodology are sound and the estimate provides the Government an acceptable basis for projecting program financial requirements. Additional investment in producibility enhancements will increase confidence in meeting or beating the production cost estimate.

**2. Funding Shortfalls Exist.** Current program financial status recognizes funding shortfalls in EMD and Production of \$54M and \$538M, respectively. The prior year portion of these shortfalls has been sourced, with the exception of \$15M. The remaining shortfall will be worked in the future programming process. The current program funding and shortfall work-arounds are adequate for executing the currently planned program. However,

any additional financial requirements that arise from claims and program activities will necessitate sourcing of additional funds.

**3. Cost Management Systems are Inadequate.** The MDC business systems are struggling to provide the management visibility and control needed to properly support the C-17 program. These systems are in a state of neglect and badly in need of improvements. MDC has been reluctant to fund improvements due to the over ceiling position of the contracts. A number of deficiencies in the estimating and cost accounting systems have been identified. In addition, the purchasing and property control systems have been disapproved. At the same time, the contractually required Cost/Schedule Control System (C/SCS) is not being fully used as a management tool by MDC or the SPO. While the C/SCS data was generally accurate, other independent management systems have been used, reducing the effectiveness of the C/SCS as a program management tool. There are readily available cost management system enhancements which would provide essential improvements to the cost efficient execution of the program by providing an accurate, common data base of information to the entire management team.

**4. The Contractor's Present Financial Condition does not Endanger Current C-17 Contract Performance.** An analysis of the contractor's financial health was conducted by reviewing the corporate cash flow projections, a Defense Contract Audit Agency/Corporate Administrative Contract Office (DCAA/CACO) 1993 review, and a DCAA analysis of selected financial ratio indicators. The analysis supports and confirms this finding.

**5. Sustaining Engineering Allocation is an Issue.** The C-17 development contract (2108) did not define a point in time to assist the contractor in separating recurring from nonrecurring engineering costs for purposes of charging or cost reporting. Currently, the MDC has incorrectly allocated the majority of its sustaining engineering effort beyond November 1988 to production.

## **SCHEDULE**

**1. Contractual Program Schedule is High Risk.** Significant concurrency between development and production has resulted in a changing configuration for the production aircraft. This changing design, coupled with a fragmented change control process, has impacted the retrofit schedule. This has further delayed the already inadequate 80 flight test month program. There is insufficient time to retrofit all of the changes, evaluate them in flight test, and incorporate them into the production aircraft to provide 12 similarly configured aircraft for the RM&A evaluation and IOC declaration. The immaturity of the aircraft design, fragmented change control process, and inadequate flight test program have resulted in a high risk program schedule. This schedule will not provide adequate data for a successful Milestone IIIB decision nor the required assets to AMC for proper operational evaluations.

**2. Integrated Master Schedule is Lacking.** MDC and the Government are not working to a common schedule. Informal agreements have been reached which are not consistent with published schedules. Additionally, a program scheduling system which would permit both the Government and contractor to operate from a common data base is nonexistent.

## **PROGRAM MANAGEMENT**

**1. The Program Cannot Proceed Toward Successful Completion Under the Existing Environment.** The fundamental elements which promote successful program execution have broken down in the C-17 program. These elements include teamwork, trust, open communication, accountability, and responsibility. The acquisition and program environment have eroded these elements to a point that both the Government and MDC have become risk averse. In addition, the overrun status of the fixed price development activities has caused MDC to become resource conservative and to actively pursue claims against the Government. MDC has missed commitments and made cost-driven decisions that were detrimental to the program. The protracted claims activity has further deteriorated the working relationship and the communications between both parties. This has slowed both Government and MDC management decision making. The combination of cost overruns and missed commitments has resulted in increased Government program oversight. This has not only hampered MDC's ability to perform, but has also further eroded the trust of both parties and elevated both the level of attention and decision making for routine program matters.

The SPO on the other hand has attempted to emphasize short-term schedule performance, with a focus on delivery to the user. All critical areas of the program, cost, schedule, and performance have been affected by these factors.

**2. Integrated Control and Tracking Systems are Deficient.** The lack of an event-driven plan, coupled with appropriate scheduling and cost control systems, makes it difficult to accurately and efficiently obtain program status. Consequently, day-to-day decision making suffers and hampers both the Government's and MDC's ability to properly plan long-range activities. The control and tracking techniques are inefficient and must be improved to provide an executable program.

MDC's strategic business objectives process was found to be a step towards a commitment to specific process improvements, although time is required to allow this process to mature and SPO awareness needs improvement.

**3. An Effective Communication System is Nonexistent.** There is no integrated management information system to provide an effective means of management communication within MDC or between MDC and the Government. A common data base available to all parties would greatly enhance communications and trust. While there has been improvement in this area, it largely has been among functional disciplines and does not represent a program-wide integrated product. While this situation is partially a result of conscientious decisions to conserve costs, the lack of a program-wide electronic communication system has hampered daily contact and contributed to the negative program environment.

**4. Existing Program Metrics are not Adequate.** While a set of metrics has been developed and is currently being used as part of the program review and management process, it lacks a standardized format and hierarchical system. The current metrics focus on historical results, with some trend projections; however, they typically lack goals, time lines for improvements, and thresholds. This results in a very laborious process to ascertain the health of the program, evaluate the root cause of problems, and effect corrective action.



**5. MDC's Management and Control of Subcontractors Appears to be Acceptable.** MDC's management and control of its subcontractors has been improved by the following: strengthening the management of the organization, incorporating of a supplier qualification and rating system, and conducting periodic joint supplier/prime/Air Force meetings to gain a common understanding of program objectives.

**6. Excessive Oversight and Management Review is Hampering the Execution of the Program.** The C-17 program has undergone intense management oversight by the Office of the Secretary of Defense (OSD) and the Air Force, as well as numerous external reviews by the General Accounting Office and the DOD Inspector General (IG) because of the high visibility of the program as a major Defense acquisition program, contract performance difficulties and associated cost overruns, and concerns about the contractor's financial condition and commitment to the program. Various OSD reviews have been performed during the same period as well as Congressional hearings and inquiries. Starting with the Major Aircraft Review (MAR) in the spring of 1990, the program was redirected and had a variety of prerequisites established for funding release and contract awards. For example, the MAR reduced program quantities from 210 to 120 aircraft. Subsequently, the FY91 authorization and appropriation acts reduced the annual buy to two aircraft from the six aircraft in the FY91 budget. It then provided insufficient funding to procure two aircraft, resulting in a zero buy in that fiscal year. Additionally, limitations were placed on award of the Lots IV and V contracts.

The SPO has reported that 61 audits (involving hundreds of separate inquiries) have been performed since April 1990. External reviews have increased in both scope and number to the point that they are hindering the SPO's ability to manage the program, as well as the contractor's ability and willingness to execute the program.

## **RECOMMENDATIONS**

It is the unanimous recommendation of the SLRG of the C-17 DSB Task Force that to continue this program, a comprehensive settlement must be implemented in an expeditious manner. The following specific recommendations should be considered in this comprehensive settlement. Each recommendation should be detailed in a Memorandum of Agreement (MOA) to be signed by both the Government and the MDC. These recommendations are based on our findings outlined above and direction provided in the Terms of Reference signed by USD(A) (Appendix A).

### **NEW PROGRAM ENVIRONMENT**

**Create a new program environment that Fosters Trust, Teamwork, Empowerment, and Accountability.** The major hindrances to an acceptable C-17 program environment include the overceiling status of the contract, the unsettled claims submitted by the contractor, the inability to meet contract specifications in the range/payload area, and late delivery of aircraft P-1 through P-6. We recommend the following actions to establish a positive program environment:

a. In consideration for paragraph b below, the Government should relieve MDC of responsibility for achieving the current contractual range/payload specifications. These specifications should be revised based on use of operational methodology criteria and incorporation of the following four design improvement initiatives:

- (1) Retaining the P&W F117 commercial baseline with the planned commercial improvements to improve SFC by 0.4 percent
- (2) Reducing the aircraft drag by one percent
- (3) Implementing weight reduction initiatives to reduce empty weight by 1,500 lbs
- (4) Increasing maximum takeoff gross weight by 5,000 lbs to 585,000 lbs

The key parameter of the C-17's Global Reach capability is the Heavy Logistics B mission profile. Based on specific recommendations by AMC, the critical performance characteristics of this mission profile should be revised to reflect a threshold of 110,000 lbs/3,200 NM and an objective of 130,000 lbs/3,200 NM. The maximum payload mission of 160,000 lbs/2,400 NM represents a small percentage of the total C-17 requirement and should be set as a program objective versus a threshold.

The Government should also release MDC from further liability for failure to deliver C-17 aircraft P-1 through P-6 in accordance with the schedule set forth in the contract; provide for the settlement of the 12 claims currently under consideration by the contracting officer or in litigation at the Armed Services Board of Contract Appeals; and release MDC of all liability for potential claims related to or incidental to the performance of C-17 program contracts on or before the date of signature of the subject MOA. However, MDC should still be responsible for correcting deficiencies and incomplete work identified on acceptance of C-17 aircraft delivered to date and not be released from any potential liability for fraud or criminal violations.

b. MDC should release the Government from all liability for claims under consideration by the contracting officer or on appeal at the Armed Services Board of Appeals, and for all potential claims related to or incidental to the performance of C-17 program contracts on or before the date of signature of the MOA. MDC should accept responsibility for sustaining engineering charges that have been, and are projected to be, improperly accounted for on the production lot contracts and reallocate them to the EMD line items of contract 2108. MDC should also revise its accounting procedures regarding charges for sustaining engineering.

c. MDC should bear all nonrecurring engineering costs associated with redesign of the C-17 wing to eliminate the requirement for supplemental straps for the current wing fix. This effort should be completed not later than the time required to permit incorporation of the redesigned wing into aircraft P-26 and all aircraft after P-26.

## **PROGRAM MANAGEMENT APPROACH**

**Create a Program Management Approach that Employs Modern Tools and Techniques to Allow Successful Execution of the C-17 Program.** To ensure the improved program environment is maintained, the correct management approach must be in place. We recommend that both the Government and MDC implement Integrated Product Development (IPD) and a disciplined systems engineering process. Implementation of both the IPD and systems engineering process should include an extensive effort to develop an event-driven, integrated master program plan and a program-wide set of accurate, consistent, and predictive metrics. These metrics should be produced in a standard format with clearly established, time-phased goals and/or thresholds. Each metric should be keyed to management action aimed at root cause problem analysis and status of corrective action. MDC should also develop a Management Information System (MIS) to provide an accurate common data base on cost, schedule, performance, and manufacturing status. Appropriate access to the MIS should be available to the SPO and DPRO. This system should include an integrated program master schedule to be available and used by all members of the C-17 team. The Government should provide up to \$30M to partially fund the MIS. Additionally, MDC should correct deficiencies in its purchasing and property control systems within 1 year from the date the MOA is signed. MDC should continue to pursue the improvements it is realizing as a result of the changes made in the subcontractor management process.

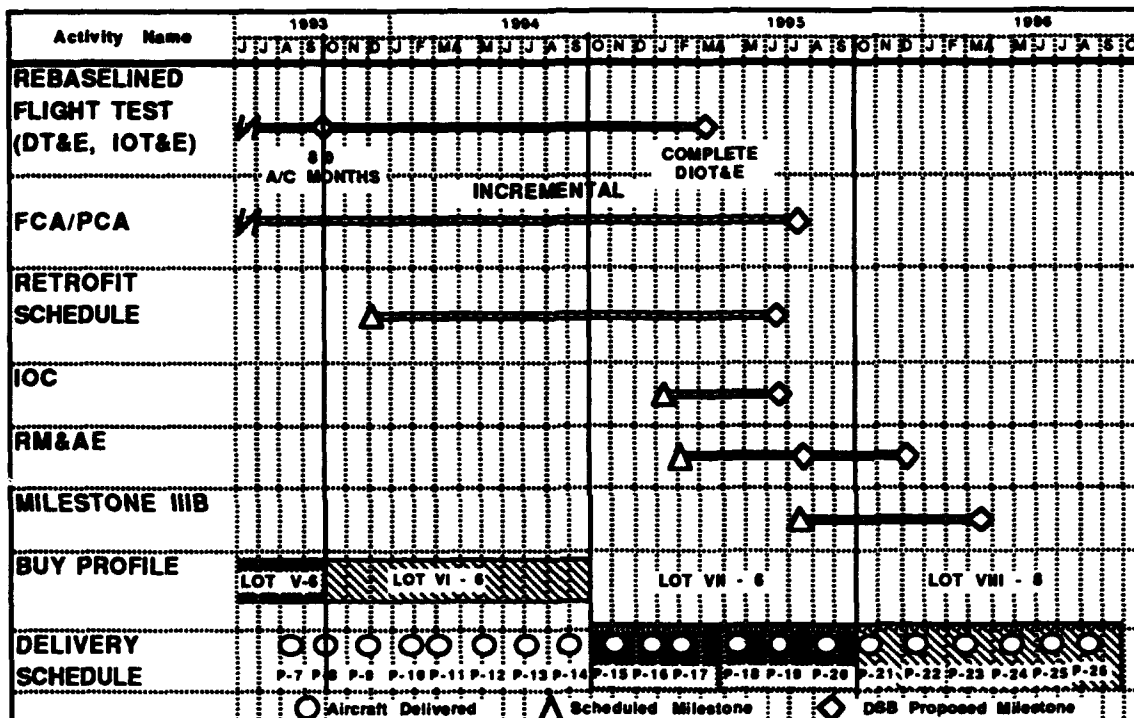
## **REDUCE THE FUTURE RISK**

**Implement Actions to Reduce the Future Risk of the C-17 Program.** In addition to an improved program environment and program management approach, several steps should be taken to ensure reduction of risk in the remainder of the program. These actions should be in three basic areas: schedule, technical, and financial.

a. **Schedule:** The program IOC and Milestone IIIB should be realigned to June 1995 (5-month slip) and March 1996 (7-month slip), respectively. Moving the Milestone IIIB will allow adequate time to complete retrofit of necessary design changes and evaluate them in the flight test program before the full-rate production decision. This includes changing the 80 aircraft month flight test program to the rebaselined test program of approximately 152 aircraft months. We recommend the cost of this flight test extension be split evenly between the Government and MDC. The retrofit schedule definition should continue with careful attention to impacts to flight test and IOC. IOC must be realigned to allow the retrofit efforts to be completed to provide the 12 similarly configured aircraft needed to support the RM&A evaluation which is triggered by declaration of IOC. The substitution of P-17 for P-5 in the delivery sequence to Charleston AFB SC will permit the RM&A evaluation to be conducted on schedule. In conjunction with the rebaselining, the FCA/PCA completion target should be redefined to July 1995 to permit baseline control to occur in a more logical manner and on an

incremental basis as system maturity allows. This then provides a more stable design on which to base production operations. To accommodate these changes and to ensure that the design has stabilized, the buy profile should be held to the present rate of six aircraft until testing can be completed. The production profile then would be FY93 - 6, FY94 - 6, FY95 - 6, FY96 - 8, FY97 - 12, FY98 - 16. The recommended schedule changes are graphically shown below:

## DSB PROPOSED SCHEDULE



b. Technical: MDC should institutionalize an aggressive reliability growth program to ensure long-term system supportability and RM&A. To improve efficiency in the manufacturing and transitions to production phase, MDC should obtain and implement modern design and manufacturing tools such as CAD/CAM. Trade studies should be completed to determine the most cost effective method to implement these systems. The Government should partially fund a CAD/CAM system which will ensure all future drawing changes will be incorporated. MDC should accelerate the C-17 tool proofing program while replacing its "inspect-in" quality system with an AQS. The Government should partially fund this AQS. MDC should implement near-term producibility projects and a long-range producibility program to improve the efficiency of the manufacturing process and to lower the aircraft unit cost. The near-term producibility projects should be implemented immediately by MDC. We understand this investment would approach \$35M. The long-term producibility program should be executed to provide continued improvements in the manufacturing capabilities of the aircraft and significant reduction in the aircraft unit cost. This program should be executed by MDC.

We estimate MDC's investment in this program would be approximately \$100M. MDC should be permitted to recoup investments for both the near-term and long-term producibility efforts as the efficiencies improve and cost savings are realized (see the financial paragraph on details of recoupment). All of these improvements should be included in a disciplined system engineering process. This process should be monitored by both Government and contractor personnel to ensure program risk reduction. Due to marginal benefit, the USD(A) should delete the production wing from the C-17 Live Fire Testing program. Both MDC and the SPO should actively continue to monitor and control the supportability and reliability process already in place.

c. Financial: Changes in the financial area should be executed to foster a positive motivation for the contractor to pursue a cost effective and successful program. Program affordability planning should be an ongoing, joint effort. Both the Government and MDC should develop an affordability plan to manage and continually assess C-17 total program cost projections against available and programmed dollars. The objective of this plan should be to facilitate balanced program decisions and to weigh performance, schedule, and cost to achieve reasonable total life cycle cost. Specific target unit costs for each production lot should be established. The affordability plan should include provisions allowing the contractor to recoup investments made for producibility that ultimately reduce the unit cost of the aircraft as well as to provide incentives on unit cost reductions. It should also provide an incentive mechanism for the contractor to share in the continued cost savings resulting from producibility investments. Finally, MDC should be motivated to reduce risk with the addition of an award fee. This should encourage MDC to comply with the recommended program changes and be more responsive to Government direction. We recommend adding an award fee provision to the Lot V contract and beyond. The Lot V award fee provision should encompass a percentage of the fee and be used as a mechanism to ensure successful implementation of the recommendations as directed by the Government. The Lot VI and beyond award fee provision should include, as a minimum, criteria for MDC's technical performance, schedule management, cost control, and other program considerations. The Government should continue to aggressively pursue work-arounds for EMD funding shortfalls. The Government should resolve the shortfalls and cover additional shortfalls resulting from implementation of this settlement.

## **CONSOLIDATED SOLUTION STRATEGY**

**Implement an Overall Consolidated Solution Strategy.** For the recommendations above to work, this entire effort should be implemented as a consolidated settlement. These recommendations cannot be successful if applied separately or partially. Instead, they must be pursued together for successful program execution. While oversight and external review functions have a legitimate need to access program information, the C-17 program could benefit from a period of no additional oversight activities or new external reviews. Given the active involvement in the DSB Task Force by DOD oversight and external review activities, additional routine oversight or review should not be necessary for 6 to 12 months following execution of an MOA implementing these recommendations (except for DCAA contract administration functions, criminal and civil investigations). We further recommend the establishment of an implementation team to monitor the execution of the MOA. This team would report directly to the USD(A) and MDC, monitor implementation of the consolidated settlement, and terminate activity after 1 year (assuming successful implementation of the consolidated settlement). The team would consist of a neutral senior industry official and an Air Force general officer from the acquisition community; neither member should be in the program chain. Additionally, there should be representatives from the contractor and other offices and agencies as deemed appropriate.

a. The SPO and DPRO should establish interface organizations for oversight and external review activities to ensure needed information is provided without undue disruption of program management officials. The interface organizations would coordinate information requests, visits and meetings; ensure the objectives and time period of external reviews are clearly defined and do not duplicate other ongoing or completed reviews; and coordinate responses to reports and recommendations made concerning the C-17 program.

b. The USD(A) should request external review organizations to defer the start of routine reviews and audits until 6 to 12 months after execution of an MOA implementing these recommendations. This would not include required DCAA audits, reviews requested by Congress or as a result of matters involving fraud, waste and abuse or violation of law. The USD(A) should also direct a moratorium on acquisition oversight activities that can reasonably be deferred for 6 to 12 months after execution of an MOA implementing these recommendations. Thereafter, to the extent practical, these activities should be consolidated in a specific time period, not extended over an undefined period.

The present level of external reviews can best be reduced through demonstrated improvements in cost, schedule, and technical performance restoring confidence in the C-17 program.

## **CONCLUSION**

It is the unanimous conclusion of each member of the DSB C-17 Task Force's SLRG that a comprehensive settlement, implemented immediately, is essential for the realization of a successful C-17 program. We believe that the C-17, implementing the recommendations in this report, can be a highly successful program.

# **APPENDICES**

APPENDIX A

THE UNDER SECRETARY OF DEFENSE

WASHINGTON, DC 20301-3000



11 May 1993

ACQUISITION

MEMORANDUM FOR CHAIRMAN, DEFENSE SCIENCE BOARD

SUBJECT: Terms of Reference--Defense Science Board Task Force  
on C-17 Review

You are requested to organize a Defense Science Board (DSB) Task Force to assess the current status of the C-17; the contractor's capability to successfully complete the C-17 development and transition into production; and identify the changes that would be necessary to ensure such success and reduce risk. The scope of the review will include an assessment of the following functional areas:

- Systems engineering (hardware and software)
- Production transition and Manufacturing Processes
- Ground and flight testing
- Financial management
- Contracting
- Project Management

Topics to be covered should include, but not be limited to, the following:

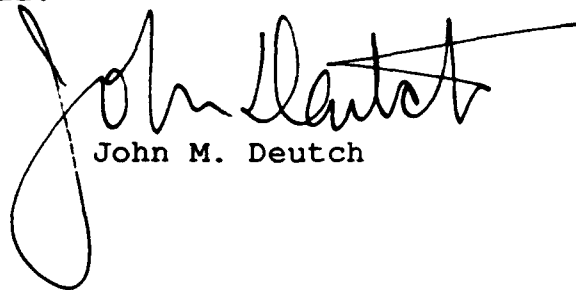
- o What are the principal areas of risk? How can this risk be properly managed?
- o What steps must the contractor take to assure satisfactory program execution?
- o What steps must the Government take to assure satisfactory program execution?
- o Are adequate resources (e.g., manpower, tooling, automated management systems) available and being properly applied? If not, what additional resources should be applied, and how much would they cost?
- o Are schedules realistic? If not, how should they be revised?
- o Is progress tracked by appropriate metrics? If not, what are the appropriate metrics that should be employed?
- o What is the status of integrated process and product development?



- o Considering the present state of the program, are there contractual changes that should be made to significantly reduce cost? If so, what are these changes?

The study will be sponsored by the Under Secretary of Defense (Acquisition). Mr. Robert A. Fuhrman and Major General James A. Fain, Jr., USAF, will serve as Co-Chairmen of the Task Force. Mr. Ronald Mutzelburg of the office of the Director, Strategic & Space Systems will serve as Executive Secretary and Mr. John V. Ello will serve as the Defense Science Board Secretariat representative. The USD(A) will provide funding and other support as may be necessary. The Task Force should begin this effort as soon as possible and provide a final report on or about July 15, 1993.

It is not anticipated that the work assigned to this Task Force will cause any member to be placed in the position of acting as a procurement official.



John M. Deutch

## **APPENDIX B**

# **METHODOLOGY**

### **OVERVIEW:**

On May 11, 1993, Mr. John M. Deutch, Under Secretary of Defense for Acquisition (USD(A)), directed the formation of a Defense Science Board Task Force to conduct a review of the C-17 program. The Task Force had access to all aspects of the C-17 program, and had authority to interface directly with the C-17 contractors at whatever level and depth the Task Force deemed necessary to accomplish a thorough and quality assessment. The Task Force was composed of over 75 Department of Defense and industry personnel in support of this vital review.

### **OBJECTIVES:**

The Task Force objectives were to assess the current status of the C-17 and the contractor's capability to successfully complete the C-17 development and transition into production, and to identify the changes necessary to ensure this success and reduce risk.

### **METHODOLOGY:**

The Task Force organization included a Senior Level Review Group (SLRG) and seven Integrated Product Teams (IPTs). The SLRG was responsible directly to the USD(A) for the overall assessment and recommendations. The IPTs conducted fact-finding and data analysis in their respective areas in support of the assessment. The IPTs included members from the Office of the Secretary of Defense, the Department of Defense Inspector General's Office, the Air Force, the Army, and the Defense Contract Management Command DPRO staff. All members selected were from organizations independent from the C-17 program. A support member from the C-17 SPO, the C-17 prime contractor and the C-17 DPRO at McDonnell Douglas Corporation was attached to each IPT to facilitate information flow.

After formation of the Task Force, including the IPTs, the following tasks were accomplished per the schedule.

a. The first preliminary fact-finding session was held on May 20 to allow the full team to understand the tasking, objectives, and schedule for the assessment. This session was followed by a program overview on May 24 presented by the C-17 System Program Office (SPO). This review covered all aspects of the program and included the following:

- (1) A look at historical events to establish a common ground for assessment
- (2) The current operational requirements and progress in meeting user requirements
- (3) An overview of the cost--both past and projected
- (4) The current and projected schedules
- (5) An overview of the specifications and the progress toward meeting them

- (6) The readiness for transition to production
- (7) The ground and flight test objectives and schedule
- (8) The current contractual arrangements
- (9) An overview of the overall management of the program by the contractor to include subcontractors
- (10) Current plans and status of the overall supportability of the C-17

Within each of these areas, the SPO discussed the background, current status, assessment of risk associated with the existing status and with any future plans and SPO recommendations.

b. The production transition and manufacturing status was assessed through three separate activities:

- (1) A review of the program by Mr. Sol Love at the request of Major General Edward Franklin;
- (2) The DSB IPT assembled for this purpose; see Appendix C for membership; and
- (3) A review conducted by Mr. W. J. Willoughby using the DOD 4245.7 templates.

The findings and recommendations contained in this report represent the combined input of these three activities.

The Task Force reconvened for a second session on May 26 to lay the ground-work for the remainder of the assessment and develop the strategy for each IPT and their area of interest before they proceeded to the contractors. Each IPT also developed a list of questions that were addressed by the contractors during their visit. These questions were provided to the contractor in advance so they could thoroughly assess each topic.

On June 1, the on-site C-17 DPRO provided a briefing to the Task Force. Next, the Task Force, including the SLRG and the IPTs, traveled to the contractor's facility and received a review from the contractor which covered the same topics which the SPO had addressed. During this trip, the SLRG and applicable IPTs also visited Edwards AFB for a review by the C-17 Combined Test Force.

The IPTs presented their preliminary findings to the SLRG on June 15. The SLRG reviewed all of the preliminary data and findings and documented their preliminary assessment in a quick-look, midterm report submitted directly to USD(A).

As a result of the midterm findings, cross-functional IPTs were formed. Their methodology was to develop and outline an approach to resolve problems identified. After receiving additional information and completing their analyses, the IPTs provided their findings to the SLRG on July 2. After additional assessment, the IPTs briefed the SLRG again on July 13.

The SLRG reviewed the final analyses and findings to ensure that all subjects of interest had been adequately covered. They then made their final assessment and ensured that all Task Force objectives had been met. The final assessment, including findings and recommendations, was presented in the form of a briefing to USD(A) on July 15, and a revised briefing on August 10, 1993.

## **APPENDIX C**

# **DSB TASK FORCE TEAM MEMBERSHIP**

### **Senior Level Review Group (SLRG)**

#### **Co-Chairman**

**Mr. Robert A. Fuhrman**

**President and COO (Ret), Lockheed Corporation**

**Lt. Gen. James A. Fain, Jr.**

**Commander, Aeronautical Systems Center**

#### **Members**

**Mr. Edward C. Aldridge, Jr.**

**President, The Aerospace Corporation**

**Mr. Oliver C. Boileau**

**President B-2 Division, Northrop Corporation**

**Dr. Malcolm R. Currie**

**Chairman and CEO (Ret), Hughes, Aircraft**

#### **Special Advisors**

**Dr. George Schneider**

**Director, Strategic & Space Systems, OSD**

**Ms. Nora Slatkin**

**Special Assistant to USD(A)**

**Mr. Donald Pixley**

**Corporate ACO, MDC**

**Col James Kluter**

**DPRO/CC McDonnell Douglas**

**Transport Aircraft**

**Mr. Derek J. Vander Schaaf**

**DOD Deputy Inspector General**

**Mr. Willis Willoughby**

**U.S. Navy/Product Integrity**

#### **Executive Secretary**

**Mr. Ronald Mutzelburg**

**Strategic & Space Systems, USD(A)**

#### **DSB Secretariat Representative**

**Mr. John V. Ello**

**Executive Director**

### **Program Primary Interfaces**

Maj. Gen. Charles "Ed" Franklin	PEO Tactical /Airlift (USAF)
Mr. Ken Francis	VP McDonnell Douglas Corporation (Contractor)

The membership of the seven IPTs is shown below. The IPTs focused on the following areas:

Systems Engineering (hardware and software) and Operational Requirements  
Production Transition and Manufacturing Processes  
Ground and Flight Testing  
Financial Management  
Contracting (including subcontracts)  
Project Management (including schedule)  
Supportability

### **Integrated Product Team Membership**

Systems Engineering (hardware and software) & Operational Requirements

Chair:	Mr. O. L. Smithers, Jr.	WL/CD
	Col Mike Gallagher	AMC
	Mr. Milt Minneman	OSD
	Lt Col James Nixon	Army/ABNSOTD-CS
	Lt Col Charles Schaefer	OASD/PA&E/TA&P
	Mr. Chuck Miller	DPRO/CV LTV
	Mr. Chandra Sankhla	DOD/IG
	Mr. Kenneth Stavenjord	DOD/IG
	Mr. Skip Hickey	ASC/YFF
	Mr. Ralph E. Grimm	ASC/SDEF
	Mr. Tom Traynor	ASC/RWE
	Mr. William Wilson	ASC/ENASD
	Mr. Mike Nicol	ASC/EN
	Mr. William Urschel	HQ AFMC/ENS

Production Transition and Manufacturing Processes

Chair:	Dr. John Halpin	ASC/EN
	Mr. Dave Hickman	OSD
	Mr. Dave Walsworth	SA-ALC/GIM
	Mr. Jim Lee	OC-ALC/TIET
	Mr. Mike Conn	DPRO Boeing
	Mr. Clarence Carroll	Dep Asst SECDEF
	Mr. Brian Flynn	DOD/IG

## Ground and Fight Testing

Chair:	Col John Morris Lt Col Howard Lewis Col Jerry Thorius Mr. Matt Keough Lt Col Charles Griffin Lt Col Paul Deehan Mr. Dennis Coldren	4950TW/CC USD(A)/T&E AFOTEC OSD/DOT&E AFOTEC 412TW/DO DOD/IG
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## Financial Management

Chair:	Ms. Donna Back Mr. Wayne Abba Mr. Lance Roark Mr. Tom Frye Mr. Gary Christie Mr. Colin Holman Mr. Anthony Finefeld Mr. Martin Gordon	ASC/FM OSD OSD ASC/FMB OUSD/AP&PI DPRO SMC/FMCI DOD/IG
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## Contracting (including subcontracts)

Chair:	Ms. Linda Williams Mr. Fred Reinhart Maj Dominic Pecora Ms. Pat Matura Mr. Haskell Lynn	SAF/AQC OSD HQ AFMC/PKA DPRO DOD/IG
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## Project Management (including schedule)

Chair:	Col W. T. Bucher Mr. Ron Mutzelburg Col Harvey Dahljelm Capt Stanley Shuba Mr. Bill Gwaltney Mr. Russell Rau Ms. Connie Wright Lt Col William Buzzell Mr. William Yri	SMC/SDS OSD OUSD/S&SS DCMDS/DPRO DPRO/CV DOD/IG ASC/CYC ASC/YPX ASC/SD
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## Supportability

Chair:	Mr. Ed Fagan Mr. Tom Parry Mr. Forest Kelman Mr. Doug Syda Mr. Mario Pastrano Mr. Dave Franke	OC-ALC/LAK OSD SA-ALC/LAP DPRO SA-AL ASC/AL
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## Advisors:

Col. Mark Sucher Maj Keith Larson	AFMC/JAS OSD/DSB
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**Secretariat:**

**Chair:**

Col Robert J. Kayuha	HQ AFMC/XRM
Maj Mike Williams	HQ AFMC/XR
Maj Kim High	ASC/YX
Capt Kirk Hunigan	HQ AFMC/XRE
Capt Mark Schreffler	HQ AFMC/XRC
Maj Greg Lewis	HQ AFMC/XRM
Capt Barb Bohman	ASC/YFM
Capt Deborah Morrell	ASC/RE-1AL
Capt Cheryl Allen	ASC/SD
Lt Leilani Muth	ASC/NAK
Ms. Kim Andries	HQ AFMC/XRS
Ms. Betty Baldwin	HQ AFMC/XR
Ms. Beverly Hannaford	HQ AFMC/XR



**APPENDIX D**  
**GLOSSARY**

<b>AQS</b>	<b>Advanced Quality System</b>
<b>AMC</b>	<b>Air Mobility Command</b>
<b>BIT</b>	<b>Built-In Test</b>
<b>CACO</b>	<b>Corporate Administrative Contract Office</b>
<b>CAD/CAM</b>	<b>Computer Aided Design/Computer Aided Manufacturing</b>
<b>CEO</b>	<b>Chief Executive Officer</b>
<b>C/SCS</b>	<b>Cost/Schedule Control System</b>
<b>CTF</b>	<b>Combined Task Force</b>
<b>DCAA</b>	<b>Defense Contract Audit Agency</b>
<b>DCMC</b>	<b>Defense Contract Management Center</b>
<b>DIOT&amp;E</b>	<b>Dedicated Initial Operation Test and Evaluation</b>
<b>DOD</b>	<b>Department of Defense</b>
<b>DPRO</b>	<b>Defense Plant Representative Office</b>
<b>DSB</b>	<b>Defense Science Board</b>
<b>DT&amp;E</b>	<b>Development, Test and Evaluation</b>
<b>EMD</b>	<b>Engineering, Manufacturing and Development</b>
<b>FCA/PCA</b>	<b>Functional Configuration Audit/Physical Configuration Audit</b>
<b>ICS</b>	<b>Interim Contractor Support</b>
<b>IG</b>	<b>Inspector General</b>
<b>IOC</b>	<b>Initial Operational Capability</b>
<b>IPD</b>	<b>Integrated Product Development</b>
<b>IPT</b>	<b>Integrated Product Team</b>
<b>ISO</b>	<b>Initial Squadron Operations</b>
<b>LFT</b>	<b>Live Fire Test</b>

<b>LSA -</b>	<b>Logistics Support Analysis</b>
<b>MAR</b>	<b>Major Aircraft Review</b>
<b>MDC</b>	<b>McDonnell Douglas Corporation</b>
<b>MIS</b>	<b>Management Information System</b>
<b>MOA</b>	<b>Memorandum of Agreement</b>
<b>MRB</b>	<b>Material Review Board</b>
<b>O&amp;S</b>	<b>Operational and Support</b>
<b>OSD</b>	<b>Office of the Secretary of Defense</b>
<b>OWE</b>	<b>Operational Weight Empty</b>
<b>P&amp;W</b>	<b>Pratt and Whitney</b>
<b>RM&amp;A</b>	<b>Reliability, Maintainability, Availability</b>
<b>SFC</b>	<b>Specific Fuel Consumption</b>
<b>SPO</b>	<b>System Program Office</b>
<b>SLRG</b>	<b>Senior Level Review Group</b>
<b>TPM</b>	<b>Technical Performance Measures</b>
<b>TQM</b>	<b>Total Quality Management</b>
<b>USD(A)</b>	<b>Under Secretary of Defense for Acquisition</b>

**C-17**

**SENIOR LEVEL REVIEW**

**GROUP**

**FINAL BRIEFING**

**23 AUGUST 1993**

**THIS BRIEFING REFLECTS THE UNANIMOUS  
POSITION OF THE  
SENIOR LEVEL REVIEW GROUP**

MR. ROBERT A. FUHRMAN

A handwritten signature in cursive script, appearing to read "Robert A. Fuhrman", written over a horizontal line.

LT GEN JAMES A. FAIN, JR.

A handwritten signature in cursive script, appearing to read "James A. Fain, Jr.", written over a horizontal line.

MR. EDWARD C. ALDRIDGE, JR.

A handwritten signature in cursive script, appearing to read "E. C. Aldridge, Jr.", written over a horizontal line.

MR. OLIVER C. BOILEAU

A handwritten signature in cursive script, appearing to read "Oliver C. Boileau", written over a horizontal line.

DR. MALCOLM R. CURRIE

A handwritten signature in cursive script, appearing to read "Malcolm R. Currie", written over a horizontal line.

# **OUTLINE**

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- **TASKING/OBJECTIVE**
- **BACKGROUND**
- **CURRENT PROGRAM STATUS**
- **PROGRAM ASSESSMENT/ISSUES**
- **RECOMMENDED SOLUTION STRATEGY**

# **OUTLINE**

---

- • **TASKING/OBJECTIVE**
- **BACKGROUND**
- **CURRENT PROGRAM STATUS**
- **PROGRAM ASSESSMENT/ISSUES**
- **RECOMMENDED SOLUTION STRATEGY**

# **TASKING**

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- **USD(A) LETTER TO DSB, 11 MAY 93**
  - **ASSESS CURRENT STATUS OF C-17**
  - **ASSESS CONTRACTOR'S CAPABILITY TO SUCCESSFULLY COMPLETE C-17 DEVELOPMENT AND TRANSITION INTO PRODUCTION**
  - **IDENTIFY CHANGES NECESSARY TO ENSURE SUCCESS AND REDUCE RISK**
  
- **USD(A) MIDTERM UPDATE, 18 JUN 93**
  - **DEVELOP SOLUTION STRATEGY FOR SUCCESSFUL PROGRAM EXECUTION**

# **SCOPE OF REVIEW**

---

- **SENIOR LEVEL REVIEW GROUP (SLRG)**
- **TEAM CONSISTED OF 75 PEOPLE FROM ACROSS OSD, DCMC, & AF**
- **ASSESSED FOLLOWING FUNCTIONAL AREAS**
  - **SYSTEMS ENGINEERING & OPERATIONAL REQUIREMENTS**
  - **SUPPORTABILITY**
  - **PRODUCTION TRANSITION & MANUFACTURING PROCESSES**
  - **GROUND & FLIGHT TESTING**
  - **FINANCIAL MANAGEMENT**
  - **CONTRACTING**
  - **PROGRAM MANAGEMENT**
- **DEVELOPED SOLUTION STRATEGY FOR SUCCESSFUL PROGRAM EXECUTION**
- **PREPARED FINAL REPORT**



# **SCOPE OF THE EFFORT**

---

- **EXTENSIVE ANALYSIS OF EVERY AREA OF THE PROGRAM**
- **DATA GATHERING**
  - **INTERVIEW/PROGRAM DOCUMENT ANALYSIS**
  - **EXTENSIVE SITE VISITS:**
    - » **MDA & DPRO, LONG BEACH CA**
    - » **C-17 SPO, DAYTON OH**
    - » **C-17 CTF, EDWARDS AFB, CA**
    - » **6 MAJOR/CRITICAL SUBCONTRACTORS**
  - **TALKED TO ALL LEVELS AT ALL LOCATIONS**
- **SOLUTION STRATEGY**
  - **FORMED CROSS FUNCTION IPTS**
    - » **MEMBERSHIP FROM DSB, MDA, SPO, DPRO**
    - » **JOINT EFFORT TO DEVELOP RECOMMENDATIONS**

<p><b>BOTTOM LINE: THOROUGH REVIEW PROVIDED INSIGHT/ DEVELOPED SOLUTION STRATEGY</b></p>
--

# **OUTLINE**

---

**•TASKING/OBJECTIVE**

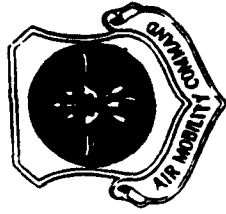


**•BACKGROUND**

**•CURRENT PROGRAM STATUS**

**•PROGRAM ASSESSMENT/ISSUES**

**•RECOMMENDED SOLUTION STRATEGY**

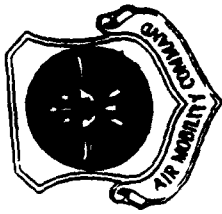


# MOBILITY REQUIREMENTS

- MOBILITY IS THE CORNERSTONE OF OUR NATIONAL MILITARY STRATEGY
  - FORWARD PRESENCE MEANS SMALLER FORCE LEVELS, CONUS BASED FORCES
  - HIGHER DEPENDENCE ON MOBILITY FOR FAST REACTIVE FORCES TO MEET GLOBAL SECURITY NEEDS
  - FLEXIBLE, RELIABLE, EFFECTIVE AIR MOBILITY FORCES ARE THE KEY
- END OF THE COLD WAR HASN'T DECREASED NEED
  - EUROPEAN DEPLOYMENT REPLACED BY REGIONAL SCENARIOS
    - » NEED CAPABILITY TO SUPPORT 2 SIMULTANEOUS CONFLICTS
  - PEACEKEEPING/HUMANITARIAN EFFORTS INCREASING
    - » REMOTE/AUSTERE OPERATIONS BECOMING THE NORM

GLOBAL REACH FOR AMERICA





# REQUIREMENT FOR THE C-17

- C-17 IS AMC'S FUTURE CORE MILITARY AIRLIFTER - THE CORNERSTONE OF FUTURE AIRLIFT FORCES
- C-141 - TODAY'S CORE MILITARY AIRLIFTER - NEAR THE END OF ITS SERVICE LIFE
  - AVERAGE AGE: 27 YEARS      AVERAGE HOURS: 37,000
  - TREND OF BAD NEWS, EARLIER AND WORSE THAN EXPECTED
  - » LATEST: WING WEEPHOLE CRACKS RESTRICT ENTIRE FORCE
- ONLY C-17 MEETS VALIDATED REQUIREMENTS FOR FUTURE AIRLIFT
  - DELIVERY OF ARMY'S LARGEST EQUIPMENT TO SHORT AUSTERE FIELDS, IN THEATER AND OVER TRANSOCEANIC DISTANCES
  - GROUND MANEUVERABILITY /BACKING TO OPTIMIZE OPERATIONS ON CROWDED/AUSTERE FIELDS

\_\_\_\_\_ GLOBAL REACH FOR AMERICA \_\_\_\_\_



# **OUTLINE**

---

**•TASKING/OBJECTIVE**

**•BACKGROUND**

**•CURRENT PROGRAM STATUS**



**•PROGRAM ASSESSMENT/ISSUES**

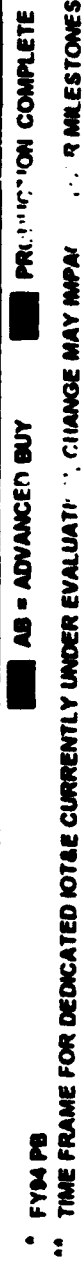
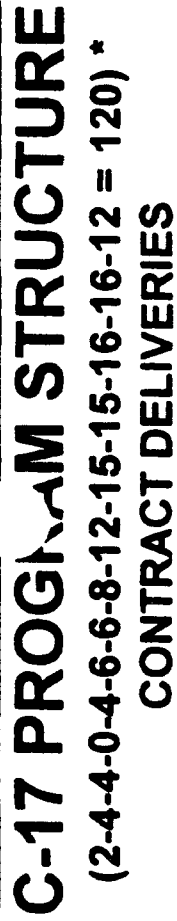
**•RECOMMENDED SOLUTION STRATEGY**

# **C-17 CURRENT STATUS**

---

## **PROGRAM IN LATER STAGES OF EMD AND EARLY STAGES OF TRANSITION TO PRODUCTION**

- **DESIGN:**
  - SEVEN AIRCRAFT FLYING TODAY (T-1, P-1 THRU P-6)
  - TWENTY AIRCRAFT NOW IN ASSEMBLY OR ON ORDER
  - ENGINEERING CHANGES CONTINUE - BACKLOG DECREASING: 1ST QTR 92 = 3500; 1ST QTR 93 = 3000
- **TEST:**
  - STATIC TEST RESTARTED
  - FLIGHT TEST OVER 40% COMPLETE
- **CONCURRENCY**
  - FIRST AIRCRAFT DELIVERED TO AMC JUN 93
- **GOVERNMENT/MDA HAVE INVESTED  
APPROXIMATELY \$9B AND OVER 8 YEARS  
INTO PROGRAM**



# ASSESSMENT

---

- C-17 IS FUNDAMENTALLY A GOOD AIRPLANE
  - SIGNIFICANTLY IMPROVES OPERATIONAL CAPABILITY
  - MEETS USER'S BASIC NEEDS
  - WILL NOT MEET ALL SPECIFICATIONS
  - DESIGN IS NOT FULLY MATURE; HOWEVER, NO NEW TECHNOLOGY REQUIRED
- MDA CAN BUILD C-17; MANAGEMENT AND EFFICIENCY IMPROVEMENTS REQUIRED
- GRIDLOCK ON CONTRACTUAL/BUSINESS ISSUES HAMPERS POSITIVE PROGRAM EXECUTION



# **OUTLINE**

---

**•TASKING/OBJECTIVE**

**•BACKGROUND**

**•CURRENT PROGRAM STATUS**

**→ •PROGRAM ASSESSMENT/ISSUES**

**•RECOMMENDED SOLUTION STRATEGY**

# **IPT ASSESSMENTS**

## **SYSTEMS ENGINEERING & OPERATIONAL REQUIREMENTS**

---

- **SYSTEM ENGINEERING PROCESS INSUFFICIENT**
  - INADEQUATE TRADE STUDIES
  - INADEQUATE RISK MANAGEMENT
  - INADEQUATE INTEGRATION FUNCTION
  - SCHEDULES NOT HARMONIZED
- **SYSTEM DESIGN NEEDS MATURING**
  - ENGINEERING CHANGE BACKLOG
- **SPECIFICATION ISSUES**
  - RANGE/PAYLOAD SPEC CANNOT BE ACHIEVED W/ CURRENT DESIGN
  - COMPUTER THROUGHPUT & RESERVE
  - BUILT-IN TEST
  - QUALIFICATION TESTING OF SUBSYSTEMS
- **MATURATION ISSUES**
  - RM&A NEEDS WORK NOW
  - STATIC & DURABILITY TESTING
  - PARATROOP TESTING
- **INTEGRATED SCHEDULE ACROSS ALL FUNCTIONS LACKING**

# **IPT ASSESSMENTS**

## **PRODUCTION MANAGEMENT & TRANSITION**

---

- **DESIGN STILL MATURING**
  - **MANY CHANGES FOR PRODUCIBILITY**
  - **MANY CHANGES FROM FLIGHT TEST**
- **CHANGES ARE DRIVING DELAYS**
- **QUALITY IS "INSPECTED IN," INSUFFICIENT OVERALL QUALITY PROGRAM**
- **INTEGRATED PROCESS JUST STARTING**
  - **IMMATURE**
- **PROGRESS HAS BEEN MADE OVER THE LAST YEAR**
  - **MUCH MORE IS NEEDED TO ENSURE REASONABLE COSTS**
  - **QUALITY**
  - **OUT-OF-STATION WORK**
  - **ECPS**
  - **SPAN TIMES**
- **600 PRODUCIBILITY ITEMS IDENTIFIED BY MDC - NEED TO BE WORKED FOR IMPROVEMENTS**
- **MODERN PROVEN TECHNIQUES AND TOOLS NEEDED**

# **IPT ASSESSMENTS**

## **GROUND & FLIGHT TEST**

---

- **SYSTEM MATURITY CURRENTLY DRIVES TEST SCHEDULE**
  - SCHEDULE MODIFICATION CRITICAL TO FLIGHT TEST
  - BUILT-IN TEST
  - STATIC ARTICLE WINGS
- **NEW INTEGRATED TEST SCHEDULE - WITH SOME RESERVE**
  - NOT ENOUGH FOR ANOTHER MAJOR REDESIGN
- **DONE IN DEC 94 - LOOKS REASONABLE**
  - TO IMPROVE EFFICIENCY, NEED TO INTEGRATE CONTRACTOR ENGINEERING (LONG BEACH, CA) AND TEST (EDWARDS AFB) DISCIPLINES

# **IPT ASSESSMENTS SUPPORTABILITY**

---

- **A BRIGHT SPOT**
- **LOOKS GOOD FOR CHARLESTON AFB**
- **PLANNING IN PLACE FOR FOLLOW-ON WITH WORK-AROUNDS WHERE NEEDED**
- **ISSUES**
  - **MUST MAKE SUPPORTABILITY GOALS**
  - **ALL PLANNING & BUDGETING BASED ON SUPPORTABILITY GOALS**

# **IPT ASSESSMENTS CONTRACTING**

---

- **CONTRACT DEFINITIZATION**
  - 14 PRODUCTION AIRCRAFT DEFINITIZED, THROUGH LOT IV
  - LONG LEAD FOR NEXT 14 AIRCRAFT BEING DEFINITIZED (LOTS V & VI)
- **CONTRACTING GRIDLOCK IMPACTING:**
  - DESIGN STABILITY
  - TEST PROGRAM
  - MILESTONE IIIB SCHEDULE

# **IPT ASSESSMENTS FINANCIAL**

---

- **PROGRAM COST**
  - UNDERSTOOD - RISK ASSESSMENT IS BEING ADDRESSED
- **MDA FINANCIAL HEALTH TO FUND 2108**
  - ABLE
  - WILLING ?
- **PROGRAM FUNDING**
  - CLAIMS RESOLUTION NOT BUDGETED
  - NO UNIT COST TARGET GOALS
- **MANAGEMENT/CONTROL SYSTEM - DEFICIENT**

# **IPT ASSESSMENTS PROGRAM MANAGEMENT**

---

- **SCHEDULE**
  - NO INTEGRATED SCHEDULE ACROSS FUNCTIONS
  - GOVERNMENT/MDC NOT WORKING TO COMMON SCHEDULE
  - IF CLAIMS ARE NOT RESOLVED, SCHEDULE WILL SLIP
- **PROGRAM PLANNING/TRACKING/CONTROL**
  - FOCUS IS SHORT TERM
  - METRICS NEED MATURING
  - POSITIVE INITIAL MOVEMENT BY MDC TO LAY IN ESSENTIAL PROCESSES
  - NO COMMON DATA BASE FOR PROGRAMMATIC DECISIONS
- **OVERSIGHT DISRUPTIVE**



# **IPT ASSESSMENTS**

## **PROGRAM MANAGEMENT (cont.)**

---

- **ORGANIZATION**

- CLASSIC FUNCTIONAL STRUCTURE (WITH ASSOCIATED PROBLEMS)
  - » LACK OF TEAM PLAY
  - » POOR INTEGRATION ACROSS FUNCTIONALS
- NEEDS LEADERSHIP, TEAMWORK, EMPOWERMENT
- WORK FORCE NOT STABLE

- **SUBCONTRACT MANAGEMENT**

- SOLID LEADERSHIP TEAM
- UNSTABLE DESIGN DRIVES ADDITIONAL ENGINEERING CHANGES TO SUPPLIERS

- **CONFIGURATION MANAGEMENT**

- SPECIFICATION CONTROL (FCA/PCA) TOO EARLY
- FRAGMENTED TEAM KING & DATA BASES

# **OUTLINE**

**•TASKING/OBJECTIVE**

**•BACKGROUND**

**•CURRENT PROGRAM STATUS**

**•PROGRAM ASSESSMENT/ISSUES**

**→ •RECOMMENDED SOLUTION STRATEGY**

# **SOLUTION STRATEGY**

---

- **OBJECTIVE: STRUCTURE A COMPREHENSIVE SETTLEMENT TO CHANGE PROGRAM ENVIRONMENT**
  - RESOLVE CLAIMS
  - ADJUST SPECIFICATIONS
  - SETTLE BUSINESS ISSUES
- **STRATEGY INCLUDES:**
  - COMPREHENSIVE SETTLEMENT RESOLVING CLAIMS, BUSINESS ISSUES, SPECIFICATION ISSUES
  - IMPLEMENTATION OF MODERN MGT TECHNIQUES, PRODUCIBILITY IMPROVEMENTS, SCHEDULE EXTENSION, NEW PRODUCTION BUY PROFILE

# **SOLUTION STRATEGY**

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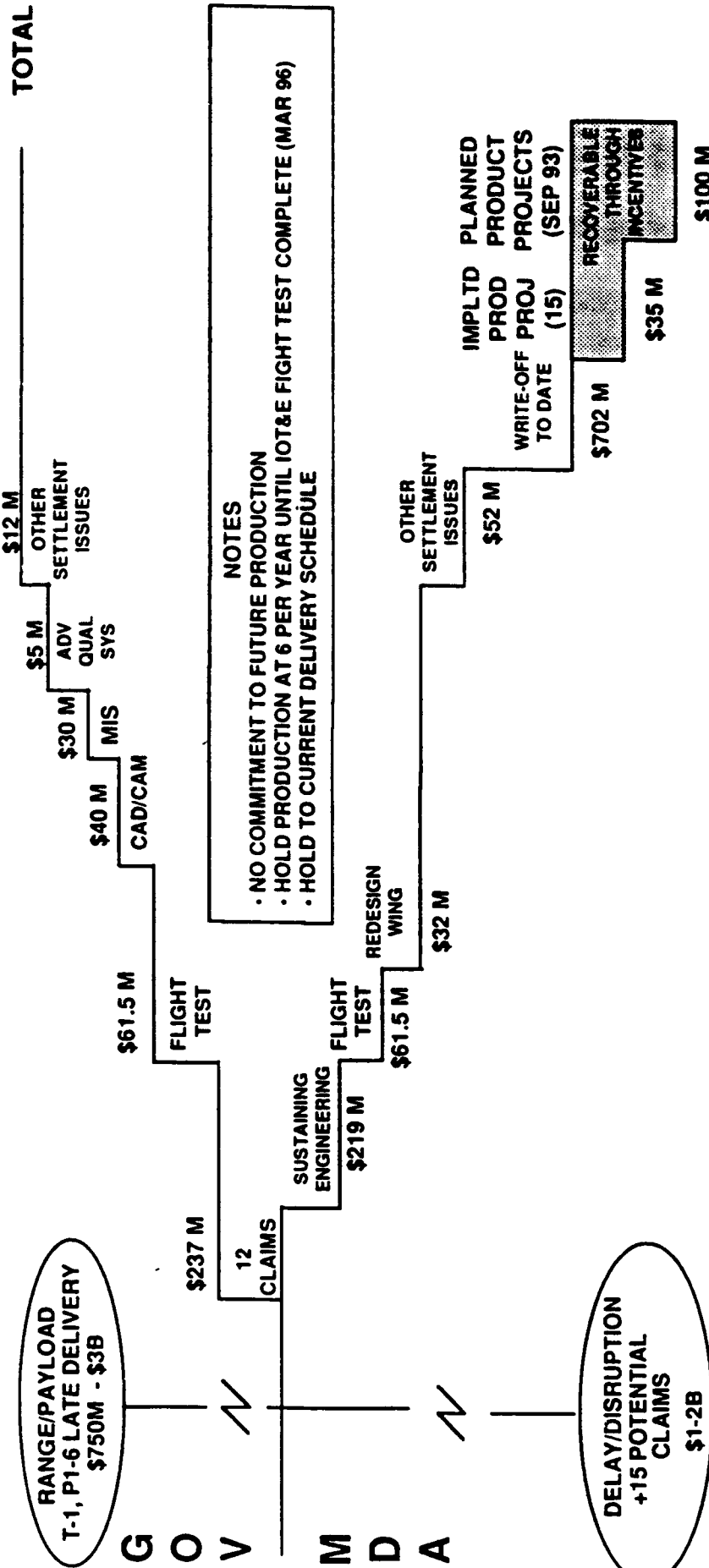
## **GROUND RULES**

- **FAIR BUSINESS ARRANGEMENT**
- **MUTUAL RELEASE OF CLAIMS AS OF SETTLEMENT AGREEMENT**
- **DOLLARS IN RECOMMENDED STRATEGY ARE ESTIMATES ONLY**
- **IMPLEMENTATION MUST INCLUDE ENTIRE PACKAGE TO BE SUCCESSFUL**

# C-17 PROGRAM SETTLEMENT

ROM NUMBERS (\$M)

GOVT ADDED FUNDING	\$237	-----	\$298.5	---	\$338.5	\$368.5	\$373.5	\$385.5	----->	\$385.5M
-----------------------	-------	-------	---------	-----	---------	---------	---------	---------	--------	----------



TOTAL

MDA's PROGRAM FINANCIAL OBLIGATION	---	\$219	\$280.5	\$312.5	-----	\$364.5	\$1066.5	----->	(\$1101.5)	(\$1201.5M)①
	---	\$219	\$280.5	\$312.5	-----	\$364.5	\$1066.5	----->	(\$399.5)	(\$499.5M)④

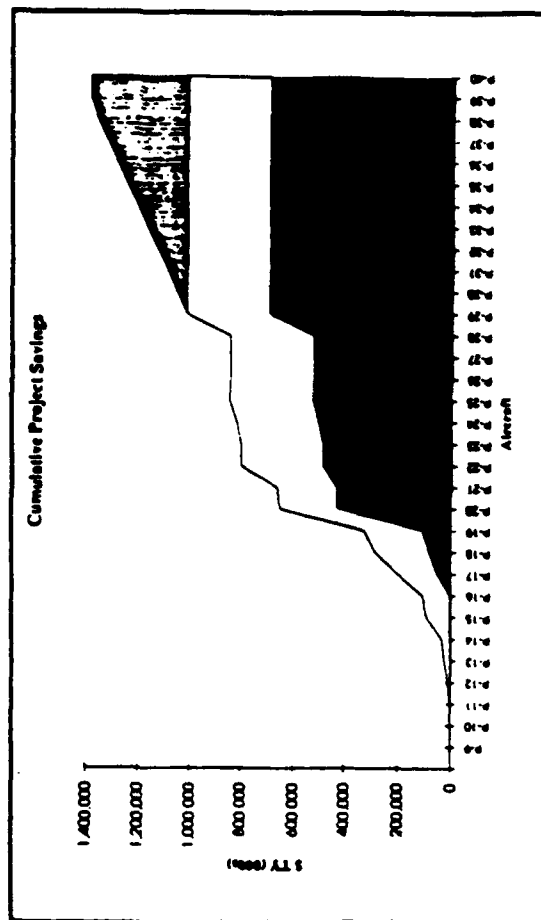
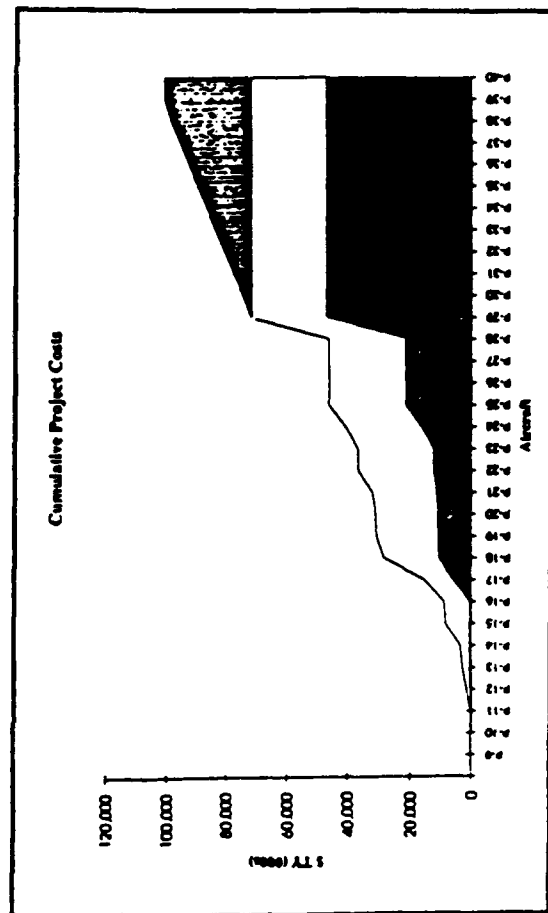
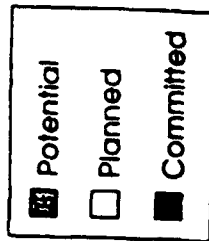
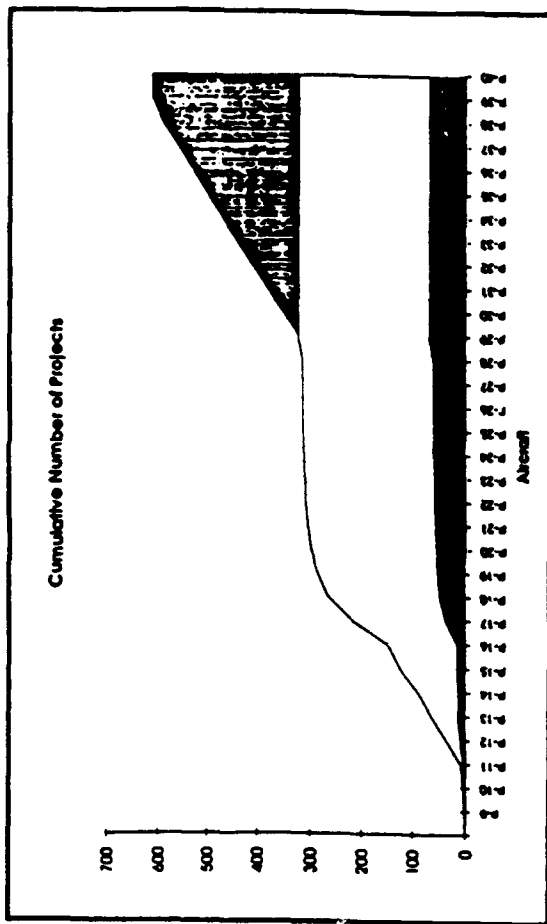
# SOLUTION STRATEGY

## CLAIM ROM ESTIMATE

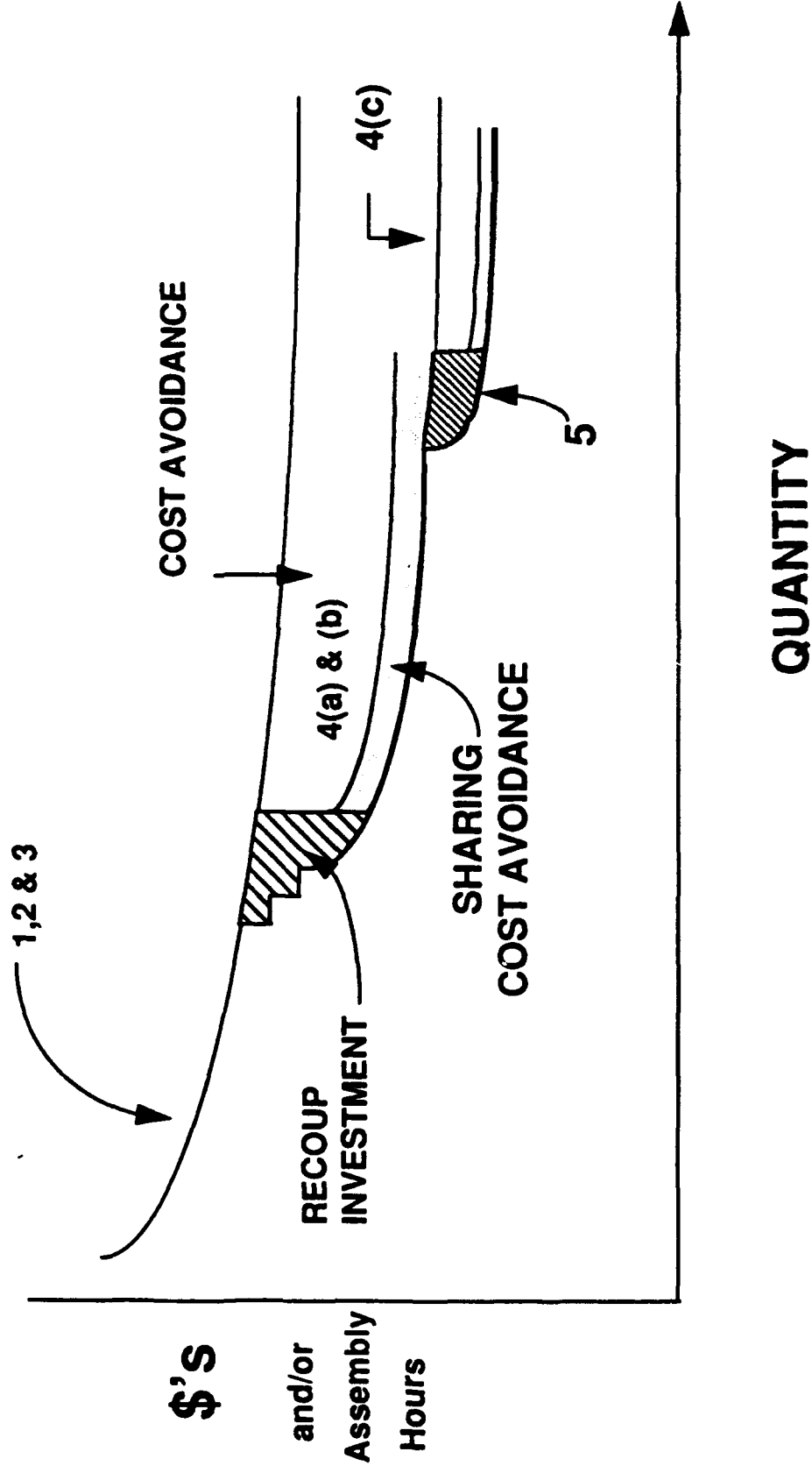
	CLAIMS	MDA	GOV'T NEW DEAL
CURRENTLY IN LITIGATION	EPA	\$71.1	0.0
	LIGHTNING STRIKE	7.1	0.0
	AIRCRAFT JACKING	2.7	0.0
	CROSSWIND LANDING	0.5	0.0
	TACAN	19.5	0.0
	COMMERCIAL PALLETS (W/DRAWN)	0.0	0.0
	FLIGHT TEST (66 TO 80 TEST MONTHS)	34.6	0.0
OTHER	ENGINE LSA	19.0	0.0
	SEAFAC	2.3	2.3
	ENGINE TRAILER	1.3	0.03
	WING BREAKOUT	234.5	234.5
	SUSTAINING ENG	79.0*	0.0*
MDA INTERNAL	AIRCREW TRAINING	UNK	0.0
		\$392M	\$237

\* NO ADDITIONAL FUNDING REQUIRED - P. 3 OF EXISTING FUNDS

# CURRENT STATUS OF C-17 PRODUCTION / COST ACTIVITIES



# PRODUCTION INCENTIVES ILLUSTRATION





# PRODUCTION INCENTIVES

## ILLUSTRATION

---

1. BASELINE KNOWN AND PLANNED PRODUCIBILITY/COST IMPROVEMENTS
2. ESTABLISH UNIT COST IMPROVEMENT CURVES
3. ESTABLISH AWARD FEE TO ACHIEVE BASELINE CURVE  
APPROX \$5M
- 4.(a) CONTRACTOR INITIATIVES IMPROVEMENT PROJECTS
  - N PROJECTS
  - Y \$'s(b) CONTRACTOR IMPLEMENTS IMPROVEMENTS
  - VERIFY DELTA \$'s SAVINGS
  - M SHIP SETS AT BASELINE COST UNTIL DELTA \$'s RECOUPED(c) NEW BASELINE
  - -----& COST AVOIDANCE
  - -----ANNUAL AWARD FEE TO NEW BASELINE
5. DO IT AGAIN

# OTHER SETTLEMENT ISSUES

---

## CONTRACTOR ACTIONS:

• -----

• -----

• RESOLVE PARATROOP AIRFLOW PROBLEM

• DEVELOP & IMPLEMENT IPT STRUCTURE TO  
INCLUDE SYSTEMS ENGINEERING

• -----

• -----

• -----

• -----

• CONDUCT TRADE STUDIES TO ADDRESS RISK  
IMPAIRS OF:

- INCREASED FUEL CAPACITY
- CORE THRUST REVERSER
- COMPOSITE NACELLE

• CORRECT PURCHASING SYSTEM

• CORRECT GOV'T PROPERTY SYSTEM

• CONDUCT INCREMENTAL FCA/PCA

• RESOLVE AIRCREW TRAINING SYSTEM

• SUBMIT PROPOSAL FOR CRASH FIRE

## GOVERNMENT ACTIONS:

### USD(A) ACTIONS:

• USD(A) WAIVE RQMNT FOR LFT ON PROD WING

### AMC ACTIONS:

• REVISE ORD TO REFLECT RANGE/PAYLOAD  
REQUIREMENTS

• WITH USA:

- DEFINE SEAT REQTS (400#, COMFORT)
- BUNDLE WEDGE & DELIVERY RATE REQTS
- DEFINE IOC

### SPO ACTIONS:

• DEVELOP IPD ORG STRUCTURE

• ADJUST PROGRAM SCHEDULE FOR FCA/PCA

• CHANGE PRODUCTION SCHEDULE TO 6-6-6/  
SLIP IOC & IIB

• ESTABLISH AWARD FEE IN LOT V

• CHANGE LOT VI TO FP/AF

• -----

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# OTHER SETTLEMENT ISSUES (CONT)

## CONTRACTOR ACTIONS:

- COMPLETE RM&A TEST IAW GROUND RULES

• -----

• -----

- ELIMINATE NEGOTIATIONS BACKLOG

- DEFINITIZE LOTS V & VI

• -----

• -----

- DEVELOP & ADHERE TO AN ACCELERATED CONTRACT NEGOTIATION TIMETABLE

• -----

- MAKE DITCHING LOCKS ELECTRONICALLY CONTROLLABLE FROM LOAD MASTER'S POSITION AND FLIGHT DECK

- FURNISH TEST REQ'T DOCUMENTS PARTS

- FAULT ISOLATION MANUALS MUST

- COMPLY WITH PARAGRAPH 3-6 OF SID

- COMPOSITE/STRUCTURES - DEVELOP REPAIR DATA FOR ALL FAILURES, INHERENT AND INDUCED

- COMPLETE RETROFIT OF FLAPS & SLATS

- DROP ISSUE ON EXERCISE OF ICS OPTION

- FORM IPTs WITH SPO TO DEVELOP DETAILED

FUNCTIONAL PLANS TO ADDRESS:

- RM&A

- MANUFACTURING PROCESS IMPROVE

- INTEGRATED MASTER PLAN

- AFFORDABILITY PLAN

- COMPUTER THROUGHPUT

- BIT NUISANCE

- SOFTWARE MGT

## GOVERNMENT ACTIONS: SPO ACTIONS

- PROVIDE GROUND RULES FOR RM&A TEST

- DEVELOP RFP FOR T-1 REFURBISHMENT, IF REQUIRED

- ISO DURATION - EXERCISE 12-MONTH OPTION

- ELIMINATE NEGOTIATIONS BACKLOG

- DEFINITIZE LOTS V & VI

- FINALIZE CONTRACT MOD T.O. MAINTENANCE

- CONCEDE SUBCONTRACTOR ENGINEERING DATA ISSUE

- DEVELOP & ADHERE TO AN ACCELERATED CONTRACT NEGOTIATION TIMETABLE

- INSTRUMENT P-3, P-4, OR P-5 FOR AIRDROP TESTING.

- DEVELOP RFP, IF NECESSARY.

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- FORM IPTs WITH MDC TO DEVELOP DETAILED

FUNCTIONAL PLANS TO ADDRESS:

- RM&A

- MANUFACTURING PROCESS IMPROVE

- INTEGRATED MASTER PLAN

- AFFORDABILITY PLAN

- COMPUTER THROUGHPUT

- BIT NUISANCE

- SOFTWARE MGT

## (TY \$ IN MILLIONS)

(257)

# SETTLEMENT IMPACT TO PRODUCTION

(TY \$ IN MILLIONS)

	<u>FY</u>	<u>88P</u>	<u>89</u>	<u>90</u>	<u>91</u>	<u>92</u>	<u>93</u>	<u>94</u>	<u>IC</u>	<u>TOTAL</u>
DSB MID										
(QTY)		(2)	(4)	(4)	(0)	(4)	(6)	(6)	(94)	(120)
\$		795	1186	1508	260	1812	2041	2374	22589	32565
+MIS								9.0	21.0	30.0
+CAD/CAM								25.0	15.0	40.0
+INST ANOTHER AIRCRAFT								.6	.4	1.0
+PRODUCIBILITY INVESTMENT								60	80	140.0
TOTAL		795	1186	1508	260	1812	2041	2469	22705	32776
94 PB		795	1186	1388	260	1812	2041	2378	23656	33516
DELTA				(120)				(91)	951	740

# DSB EXCURSION WITH SETTLEMENT\*

(TY \$ IN MILLIONS)

DSB		<u>POE</u>	<u>PROFILE</u>	<u>DSB**</u>	<u>BEST*</u>	<u>MID*</u>	<u>WORST*</u>
		<u>CHANGE</u>					
EMD		5686	5686	5923	5923	5923	5923
94 PB		5632	5632	5632	5632	5632	5632
DELTA	(54)	(54)	(54)	(291)	(291)	(291)	(291)
PROD		34054	34856	34927	31829	32776	34012
94 PB		33516	33516	33516	33516	33516	33516
DELTA	(538)	(538)	(1340)	(1411)	1687	740	(496)
TOTAL							
SHORTFALL	(592)	(1394)	(1702)	1396	449	(787)	
TOTAL CHANGE FROM DSB**				3098	2151	915	

\*SETTLEMENT + PRODUCIBILITY ENHANCEMENTS

\*\* SETTLEMENT - NO PRODUCIBILITY ENHANCEMENTS

# **SETTLEMENT IMPLEMENTATION**

---

- **ISSUE**
  - NO CERTIFIED COST AND DATA FOR DELAY AND DISRUPTION CLAIMS
  - DIFFICULT TO ASSESS CONSIDERATION REQUIRED
- **GOVERNMENT POSITION ON RANGE/  
PAYLOAD DIFFICULT TO ESTIMATE/PROVE**
- **DELAYED EXECUTION OF SETTLEMENT:**
  - INCREASES AMOUNT OF DATA REQUIRED FOR REVIEW

# **DSB TASK FORCE RECOMMENDATIONS**

---

- **USD(A) EXECUTE CONSOLIDATED  
SETTLEMENT WITH MDC CEO**
  - REBASELINE PROGRAM NOW
  - SOLUTION STRATEGY FOR RESOLUTION OF ALL  
CLAIMS & POTENTIAL CLAIMS TO DATE
    - » RELEASE BOTH PARTIES FROM LIABILITY TO DATE
  - EXECUTE MANAGEMENT INITIATIVES
  - SOLVE MANAGEMENT ENVIRONMENT
  - ESTABLISH IMPLEMENTATION TEAM
  - WAIVE CERTIFIED COST & PRICING DATA  
REQUIREMENT



# **SUMMARY**

---

- **C-17 MEETS USER'S BASIC NEEDS**
- **PROGRAM IN LATE EMD TRANSITIONING TO PRODUCTION**
  - **CONCURRENCY INCREASES TECHNICAL RISKS**
  - **DESIGN STILL MATURING**
- **BIGGEST PROBLEM -- MANAGEMENT ENVIRONMENT**
  - **INTENSE EXTERNAL SCRUTINY**
  - **CLAIMS HAMPERING EXECUTION**
  - **STRAINED CONTRACTUAL RELATIONSHIPS**
- **CONSOLIDATED SETTLEMENT FIXES CONTRACT AND ENVIRONMENT**
- **RECOMMENDED CHANGES MUST BE IMPLEMENTED TO INCREASE PROGRAM SUCCESS LIKELIHOOD**